

Phase diagram of the...

S/078/62/007/010/002/008
B144/B186

of Mg_4Pd and $MgPd$. The structure of the other compounds remains to be elucidated. The Brinell hardness increased up to 230 with a Pd content of 39% by weight; it could not be measured from 39 to 87% because of the brittleness of the alloys, and it decreased from 218 to 101 when the Pd content was increased from 87 to 92% by weight. Microhardness ranged from 180 - 260 kg/mm^2 . Conclusion: The system is made up of 5 chemical compounds whereof 3 are formed by peritectic reactions, namely: Mg_6Pd , Mg_4Pd , and Mg_3Pd . Mg_2Pd_3 melts congruently at $1350 \pm 10^\circ C$. When the temperature is reduced, $MgPd$ forms at $700 \pm 10^\circ C$ from Mg_3Pd and Mg_2Pd_3 . There are 5 figures and 2 tables. ✓

SUBMITTED: January 16, 1962

Fig. 2. Phase diagram of the $Mg - Pd$ system.
Legend: (a) Pd, % by weight; (b) Pd, at.-%.

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AID Nr. 982-13 4 June
EFFECT OF TEMPERATURE ON MECHANICAL PROPERTIES OF URANIUM
(USSR)

Savitskiy, Ye. M., M. A. Tylkina, and V. F. Terekhova. IN: Akademiya
nauk SSSR. Institut metallurgii imeni A. A. Baykova. Trudy, no. 11, 1962,
133-142. S/509/62/000/011/010/019

Mechanical properties of hot-rolled uranium (99.7% U and 0.26-0.25% C) have been tested at -196° to 1100°C . Uranium hardness was found to drop from 332 kg/mm^2 at -196°C to 21 kg/mm^2 at 800°C . The temperature coefficient of hardness for α -uranium was found to be $0.9 \cdot 10^{-3}$. Cold working with 50% reduction increases the room temperature hardness by 70 kg/mm^2 . The ductility of uranium increases and its resistance to deformation decreases with increasing temperature. In upsetting at 50 mm/min, cylindrical specimens 9.8 mm in diameter and 15 mm long can withstand 33% reduction at 20°C , 60 to 75% at 500 to 600°C , and 97% at 850°C . To obtain a reduction of 10% at

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AID Nr. 982-13 4 June

EFFECT OF TEMPERATURE [Cont'd]

S/509/62/000/011/010/019

100°C a stress of 90 kg/mm² is needed, but only 1 kg/mm² at 800°C. The tensile strength at room temperature was found to be 82 kg/mm²; the elongation, 2%; and the reduction of area, 4%. With increasing temperature the tensile strength decreases continuously; elongation and reduction first increase, drop somewhat at 760°C, reach a maximum (~ 35% elongation, and 100% reduction of area) at ~ 1000°C, and then drop sharply. The notch toughness of uranium at room temperature is low (1.7 kg·m/cm²); it rises to 7.3 at 600°C, drops to 0.5 at 750°C, and increases to ~ 12 kg·m/cm² at ~ 850°C. The latter increase proves the high ductility of γ-uranium. The same temperature dependence is observed in impact upsetting: with a single hammer blow the specimens can be upset, without cracks, by 90% at 800°C and by 99.7% at 1000°C, but by only 9.5% at 700°C. These results confirm the existence of the three allotropic transformations which uranium undergoes with increasing temperature, with the α-phase having a medium ductility, the orthorhombic β-phase a very low ductility, and the cubic γ-phase a very high ductility.

[ND]

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SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; BUROV, I.V.

Phase diagram of the system of cobalt-gadolinium alloys.
Zhur.neorg.khim. 7 no.11:2572-2574 N '62. (MIRA 15:12)
(Cobalt-gadolinium alloys)

SAVITSKIY, Ye.M.; ZAKHAROV, A.M.

Phase diagram of the ternary system consisting of
niobium - tungsten - zirconium, Zhur.neorg.khim.
7 no.11:2575-2580 N '62. (MIRA 15:12)
(Niobium-tungsten-zirconium alloys)

SAVITSKIY, Ye.M.; TAO TSZU-TSUN [T'ao Tsu-ts'ung]

Mechanism of twinning in the deformation of single crystals
in the Mo-35 at. % Re alloy. Fiz. met. i metalloved. 14
no.1:148-150 J1 '62. (MIRA 15:7)

1. Institut metallurgii imeni A.A. Baykova.
(Metal crystals)

S/032/62/028/008/004/014
B139/B104

AUTHORS: Savitskiy, Ye. M., Chuprikov, G. Ye., and Glavin, G. G.

TITLE: Analysis of the gases in rhenium

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 8, 1962, 957 - 959

TEXT: The gases contained in rhenium samples (pieces and powder) were determined by vacuum melting. The choice of the crucible metal is important. Evaluation of phase diagrams for the binary systems Fe-Re, Ni-Re and Pt-Re showed that Ni-Re has the lowest melting temperature and the highest range of solid solution (up to 60%). For the system Re-Ni, the heat of mixing per mole was calculated as +5000 cal., for Re-Fe as +7350 cal. and for Re-Pt as 11200 cal. Hence the crucible used was of nickel. Additional amounts of nickel were put into the crucible as necessary to avoid the rhenium concentration in the melt being raised above 50% on inserting further rhenium samples. The gases were extracted from rhenium samples in compact pieces for 10 to 15 min. at 1700°C; weight of the sample 0.5 g. The powder samples were filled into graphite capsules and the gases extracted for 10 min. at 1900°C. The volume % content of oxygen, hydrogen

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Analysis of the gases ...

S/032/62/028/008/004/014
B139/B104

and nitrogen was determined. The rhenium for the samples was produced by electrolysis, by reduction from NH_4ReO_4 and by powder metallurgy. There are 1 figure and 2 tables.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskey promyshlennosti (State Design and Planning Scientific Research Institute of the Rare Metals Industry)

Table 2. Results.

Legend: (1) O_2 , % by weight; (2) H_2 , % by weight; (3) N_2 , % by weight; (4) electrolytic Re powder; (5) Re powder reduced from NH_4ReO_4 ; (6) powder-metallurgical Re; (7) cast Re; initial material: reduced Re powder.

(1)	(2)	(3)	(4)
0.043	0.05	0.46	0.95
0.039	0.051	0.53	0.89
0.041	0.049	0.50	0.92
0.0006	0.0008	0.006	0.003
0.0006	0.0003	0.0071	0.004
0.0007	0.0003	0.0072	0.003
0.001	0.0002	0.012	0.003
0.001	0.0002	0.009	0.0025

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ALEKSEYEVSKIY, N.Ye.; SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.

Effect of alloyed elements on the superconducting properties
of the compound V_3Si . Dokl.AN SSSR 145 no.1:82-84 J1 '62.
(MIRA 15:7)

1. Institut fizicheskikh problem AN SSSR i Institut metallurgii
imeni A.A.Baykova. 2. Chlen-korrespondent AN SSSR (for
Aleksyevskiy).
(Superconductivity) (Vanadium silicide) (Molybdenum silicide)

SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.

Vanadium recrystallization diagram. Dokl.AN SSSR 145 no.3:612-
614 J1 '62. (MIRA 15:7)

1. Institut metallurgii imeni A.A.Baykova. Predstavleno akademikom
I.V.Taranayevym.
(Vanadium) (Crystallization)

SAVITSKIY, YE. M.,

"The present status and problems in further studies of alloys of rare-earth metals"

report presented at the Conf. on New Trends in the Study and Applications of Rare Earth Metals, Moscow, 18-20 Mar 63

SAVITSKIY, Ye.M.; KEYS, N.V.; POPOV, V.F.; LYUBIMOV, V.N.; ZHUKOV, D.G.;
MALINOVSKAYA, T.I.

Effect of rare-earth metals on the properties of stainless steel.
Izv. AN SSSR. Otd. tekhn. nauk. Met. i gor. delo no. 1:133-137 Ja-F '63.
(MIRA 16:3)

(Steel, Stainless—Metallurgy)

(Rare earth metals)

ACCESSION NR: AR4027928

S/0137/64/000/002/V044/V044

SOURCE: RZh. Metallurgiya, Abs. 2V302

AUTHOR: Savitskiy, Ye. M.; Terekhova, V. F.

TITLE: Physicochemical principles of modification of cast iron and steel by rare earth metals

CITED SOURCE: Sb. Mekhan. svoystva litogo met. M., AN SSSR, 1963, 71-76

TOPIC TAGS: rare earth metal, deoxidizer, desulfurizer, cast iron modification, steel modification

TRANSLATION: The physicochemical principles of modifying cast iron and steel by rare earth metals are discussed. Rare earth metals are strong deoxidizers for most metals and alloys, and their introduction into metals improves the mechanical properties. In deoxidizing steel, 0.2-0.3% of total rare earth metals (mischmetal or Fe-Ce) is recommended. For economy purposes, it is recommended that the deoxidation by rare earth metals be carried out in ladles for deep deoxidation and only in the case of high-quality steels. Rare earth metals are good desulfurizers. Because of their high chemical activity, they bind low-melting compounds, which

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ACCESSION NR: AR4027928

cause red shortness (S, P, As, Pb, Bi, Sn, etc.), into high-melting binary and more complex compounds which can be removed with the slag. When rare earth metals are added to cast irons, the transformation of lamellar graphite into spheroidal graphite is observed. G. Lyubimova

DATE ACQ: 19Mar64

SUB CODE: ML

ENCL: 00

Card 2/2

SAVITSKIY, Ye.M. (Moskva); KIM, T.A. (Moskva)

Structure and properties of alloys obtained by the eutectic change
method. Izv. AN SSSR. Otd. tekhn. nauk. Met. i gor. delo no.4:
89-94 J1-Ag '63. (MIRA 16:10)

SAVITSKIY, Ye.M.; ZAKHAROV, A.M.

Investigating ternary systems niobium - tungsten - zirconium
and niobium - molybdenum - zirconium. Issl. splav. tsvet.
met. no.4:108-116 '63. (MIRA 16:8)

(Niobium-tungsten-zirconium alloys—Metallography)
(Niobium-molybdenum-zirconium alloys—Metallography)
(Phase rule and equilibrium)

SAVITSKIY, Ye.M. (Moskva); BARON, V.V. (Moskva)

Development of superconducting materials. .Izv. AN SSSR. Met.
i gor. delo no.5:3-12 S-0 '63. (MIRA 16:11)

L 12917-63

EWT(1)/EWP(q)/EWT(m)/BDS

AFFTC/ASD/ESD-3

JD/JG/IJP(Q)

ACCESSION NR: AP3000200

S/0136/63/000/005/0051/0053

AUTHOR: Savitskiy, Ye. M.; Terekhova, V. F.; Naumkin, O. P.; Burov, I. V.

TITLE: Growing scandium, yttrium, and gadolinium single crystals

SOURCE: Tsvetny*ye metally*, no. 5, 1963, 51-53

TOPIC TAGS: single crystals, scandium, yttrium, gadolinium, microhardness

ABSTRACT: A method of growing Sc, Y, and Gd single crystals has been developed at the Institut metallurgii im. A. A. Baykova (Institute of Metallurgy). The commercial grades of these metals have a purity not exceeding 98%. Oxygen, calcium, copper, iron, tantalum, fluorine, and other rare-earth metals are the main impurities. The commercial-grade Sc, Y, and Gd were first refined by electron-beam zone melting and high-vacuum distillation to a purity of 99.3 to 99.5%, mainly, by removal of such impurities as O₂, Ta, and Ca. The dissolved rare-earth metals could not be eliminated. Single crystals with cross sections of 5 x 5 to 10 x 12 mm were grown from distilled metals by recrystallization annealing in vacuum at 1000 — 1400C (depending on the metal). Other methods of crystal growing did not yield satisfactory results. The crystal orientation was determined by x-ray diffraction. The average microhardness of Sc single crystals

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L 12917-63

ACCESSION NR: AP3000200

was 210 kg/mm² on the basis face and 100 to 110 kg/mm² on the prism face. Studies of the electrical and magnetic properties, coefficient of heat expansion, and ductility of Sc, Y, and Gd single crystals are being continued and will be the subject of another report. Orig. art. has: 4 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 00

DATE ACQ: 14Jun63

ENCL: 00

SUB CODE: ML,MA

NO REF SOV: 003

OTHER: 003

Card 2/2

L 14956-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG
ACCESSION NR: AP3004786 8/0129/63/000/008/0033/0038 68

AUTHOR: Savitskiy, Ye. M.; Keys, N. V.; Popov, V. F.; Lyubimov, V. N.; Zhukov,
D. G.

TITLE: Properties of Kh18N12M2T stainless steel containing oxides of rare-earth
metals 27 18 76 27

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1963, 33-38

TOPIC TAGS: Kh18N12M2T stainless steel, AISI 316T steel, rare-earth metal oxide
addition, optimum amount, steel tensile strength, room-temperature ductility, hot
ductility, formability microstructure

ABSTRACT: The effect of 0.08 and 0.12% additions of rare-earth metal (REM) oxides
on properties of Kh18N12M2T [AISI 316T] stainless steel has been investigated in
three production-scale heats. The oxides were put in a 40-ton preheated ladle
5-8 min before tapping the furnace and casting the steel into 4.5-ton ingots.
Test specimens were cut from the top, middle, and bottom sections of the ingots.
Ductility characteristics of rolled metal were measured both along and across
the direction of rolling. Steel ingots with REM oxides were found to have a

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L 14956-63

ACCESSION NR: AP3004786

dense flawless surface requiring only slight surface conditioning and a fine dense macrostructure without traces of segregation. Rolled blooms also had no surface defects. The amount of ferrite in REM-oxide-treated steel was 50 to 75% smaller than in untreated steel, and its distribution along the ingot height was more uniform. Addition of REM oxides improved steel formability and resistance to intercrystalline corrosion and increased the yield by about 0.5%. An addition of 0.08% REM oxides increased the room-temperature tensile strength by 11.5% and the yield strength by 15.4%; no further improvement was observed when the REM oxide content was raised to 0.12%. While the hot ductility of the steel without REM oxides gradually improved as the test temperature increased to 1000 and 1200C, it increased by 1.5-2 times with an addition of 0.08% of REM oxides. In hot ductility torsion tests, steel specimens with 0.08% REM oxides withstood 18 and 28 turns at 1000 and 1200C, respectively, while specimens of untreated steel failed after 8-10 and 12-15 turns. The REM-oxide-treated steel also had a finer austenite grain, lower anisotropy of the mechanical properties, and higher ductility, particularly across the direction of rolling. In general, addition of REM oxides is especially effective in casting large ingots and shaped castings. Orig. art. has: 5 tables.

ASSOCIATION: Inst. metallurgii im. A. A. Baykova (Inst. of Metallurgy)
(Chelyabinsk Metallurgical Plant)

Card 2/32

L 14957-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG
 ACCESSION NR: AP3004790 S/0129/63/000/008/0059/0061 59
 58

AUTHOR: Popov, V. F.; Savitskiy, Ye. M.

TITLE: Chemical inhomogeneity of structural and stainless steels treated with rare-earth metals 77 14

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1963, 59-61

TOPIC TAGS: Kh18N12M2T stainless steel, AISI 316T steel, low-alloy steel, 30KhGSA steel, 18KhNVA steel, cerium addition, chemical inhomogeneity, segregation, sulfur segregation, cerium effect

ABSTRACT: The effect of the addition of 0.10—0.28% ferrocerium to Kh18N12M2T stainless steel [AISI 316T] and the low-alloy structural steels 30KhGSA, 0.28—0.35% C, 0.80—1.10% Mn, 0.90—1.20% Si, 0.80—1.10% Cr) and 18KhNVA, 0.14—0.21% C, 0.25—0.55% Mn, 0.17—0.37% Si, 1.35—1.65% Cr, 4.00—4.50% Ni) on their chemical inhomogeneity in the as-cast and rolled conditions has been investigated. In all steels tested the addition of 0.04—0.08% Ce lowered the sulfur content to 0.008—0.009%, compared with 0.01—0.012% in steels without Ce. In individual macrovolumes of ingots and rolled billets the sulfur content decreased by as much

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L 14957-63

ACCESSION NR: AP3004790

50%. Analysis of specimens cut from the various portions of ingots showed that addition of 0.1% Ce had no marked effect on the segregation of sulfur in carbon Kh18N12M2T. In 30KhGSA and 18KhNVA ingots, Ce promoted the segregation of sulfur in proportion to the amount added, but had no effect on the segregation of carbon and phosphorus. In rolled billets of the 30KhGSA and 18KhNVA steels, sulfur and cerium distribution followed a pattern similar to that in ingots, and their segregation increased with increasing cerium content. Orig. art. has: 3 figures.

ASSOCIATION: Institut Metallurgii im. Baykova (Institute of Metallurgy)

SUBMITTED: 00

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: ML

NO REF SOV: 000

OTHER: 000

Card 2/2

L 39961-65 EVIT(in)/EWP(w)/EWIA(d)/T/EWP(t)/EWP(b)/EWIA(c) IJP(c) JD/JG

ACCESSION NR: AP4000460 S/0078/63/008/012/2685/2693

AUTHOR: Burov, I. V.; Terekhova, V. F.; Savitskiy, Ye. M.

TITLE: Phase diagram of the cerium-gadolinium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 8, no. 12, 1963, 2685-2693

TOPIC TAGS: cerium gadolinium system, cerium gadolinium phase diagram, cerium gadolinium alloy, structure, phase composition, crystal lattice, lattice parameter, magnetic property, electron structure, cerium gadolinium alloy magnetic property, cerium gadolinium alloy lattice, cerium gadolinium alloy crystal structure

ABSTRACT: There is no literature on the above system. Interaction of metals belonging to different rare earth subgroups (cerium and yttrium subgroups) is but scantily studied and the authors try to fill this lacuna starting from the assumption that only high temperature modifications of δ -cerium and β -gadolinium show favorable conditions for forming continuous solid solutions.

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L 39961-65

ACCESSION NR: AP4000460

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However, the χ -phase was found in alloys with 53% Gd. The phase diagram Ce-Gd is studied for all intervals of concentrations. Pure metals were annealed at 1200C for 10 hours in vacuum and 18 alloys were prepared in an electric furnace. Ingots were cold-rolled and annealed (200 hrs. at 600 - 700C). Differential thermal analysis was made with micro-samples under vacuum. Solidus point for Gd-rich alloys was determined with an optical pyrometer. Slides were polished with chromium oxide and kerosene, etched with HNO_3 . Passivated slides were radiographed in filtered copper radiation, Gd-rich (over 30%) in iron radiation. Akulov's anisometer was used in determining the ferromagnetic Curie point (θ_f). Paramagnetic susceptibility was determined, V. I. Chechernikov and Yu. Pop participating, by the Faraday-Sucksmith method. Phase diagrams were prepared. The conclusions are: a chemical compound Ce_2Gd_5 (χ -phase) having a samarium-type lattice was found. The χ -phase has the following lattice parameters: along rhombohedral axes: $a=3.97 \pm 1 \text{ \AA}$, $\alpha=23^\circ 21'$; along hexagonal axes: $a=3.64 \pm 1 \text{ \AA}$, $c=26.27 \text{ \AA} \pm 1 \text{ \AA}$. Experimental data indicate that the phase diagram is determined not only by the

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L 39961-65

ACCESSION NR: AP4000460

valence electrons but also by the structure of deeper shell electrons, in the given case by the f-shell electrons. Orig. art. has: 5 figures, 3 tables.

ASSOCIATION: None

SUBMITTED: 26Dec62

ENCL: 00

SUB CODE: mm

NO REF SOV: 005

OTHER: 005

Card 3/3 JO

ACCESSION NR: AT4009500

S/2509/63/000/014/0139/0146

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Yefimov, Yu. V.; By*chkova, M. I.

TITLE: Interaction of niobium and vanadium with magnesium

SOURCE: AN SSSR. Institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metal-lovedeniya, fiziko-mekhanicheskiye metody* issledovaniya, 139-146

TOPIC TAGS: niobium, vanadium, magnesium, binary alloy, niobium purification, vanadium purification.

ABSTRACT: Of the three metals in group V of the periodic table, most attention, at present, is being given to niobium and vanadium. These metals are quite pliable in the pure state, but their properties are markedly affected by traces of C, N, O or H. Their purification is therefore unusually important, and one of the most promising techniques for their purification is reduction of their oxides or nitrides with an active element such as Mg. The present investigation concerned the interaction of vanadium and niobium with magnesium. On the basis of studies of the macro- and micro-structure, X-ray and thermal analysis, as well as hardness and micro-hardness determinations, the phase diagrams of the V-Mg and Nb-Mg systems could be plotted. Both systems showed immiscibility in the liquid and solid states, including practically the entire concentration range. Very narrow

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ACCESSION NR: AT4009500

areas of solid solutions are formed on the vanadium and niobium sides. The solubility limit of magnesium in vanadium and niobium at 20C is 0.01 and 0.04%, respectively; at the monotectic temperature (1860C for V-Mg and 2380C for Nb-Mg), the corresponding figures are 0.03-0.04 and 0.05%, respectively. This does not significantly affect the structure of V and Nb. Vanadium and niobium do not dissolve in solid magnesium. In liquid Mg the solubility of vanadium at 660C is 0.06%, increasing to 0.3% at 950C, while the solubility of niobium in magnesium at 1200C is 0.05%. Melting with magnesium leads to reduction of vanadium and niobium, lowering their strength and hardness and increasing their plasticity. However, reduction of vanadium and niobium is hampered by the high vapor pressure of magnesium and the difficulty of removing the slag. Orig. art. has: 3 figures and 3 tables.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00

DATE ACQ: 25Jan64

ENCL: 00

SUB CODE: MM

NO REF SOV: 006

OTHER: 006

Card 2/2

ACCESSION NR: AT4009501

S/2509/63/000/014/0147/0154

AUTHOR: Savitskiy, Ye. M.; Kim, T. A.

TITLE: Changing the structure and mechanical properties of alloys based on metallic compounds by substitution of low-melting components

SOURCE: AN SSSR. Institut metallurgii. Trudy*, no. 14, 1963. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody* issledovaniya, 147-154

TOPIC TAGS: alloy, metallic compound, low-melting alloying element, alloy structure, alloy mechanical property, eutectic, eutectic substitution, aluminum, aluminum copper alloy, magnesium silicon alloy, aluminum nickel alloy, aluminum tin alloy, aluminum zinc alloy

ABSTRACT: Thousands of metallic compounds are presently known which are of both practical and theoretical interest in view of their desirable metallic properties (hardness, refractoriness, acid resistance, etc.) but which cannot be used in pure form due to extreme brittleness at room temperature. It is possible to create more useful alloys by combining the hardness of the metallic compounds with the plasticity of other metals and alloys, this being especially true in the case of eutectic systems. The present study was designed to determine the possibility of improving the mechanical properties of metallic compounds by replacing the

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ACCESSION NR: AT4009501

eutectic with a more plastic component. Experiments were carried out with brittle systems consisting of 79% Mg and 21% Si, or of 47% Cu and 53% Al, in which the eutectic was replaced by pure Al or Al-Sn and Al-Zn alloys; for comparison, experiments were also done with the plastic alloy consisting of 80% Al and 20% Ni. The technique of replacing the eutectic is described in detail and the vacuum apparatus designed for this purpose is shown in the Enclosure. The alloys obtained were then subjected to hot pressing (350-500C, 40-50 kg/mm², 80% compression) and tested for mechanical properties. Microphotography was also employed to reveal changes in alloy structure after substitution. The data obtained showed that the plasticity of the Cu-Al alloys was increased 3-fold by substitution with 75-80% Sn and 25-20% Al, while the ultimate strength was almost doubled and the hardness was not significantly changed. The plasticity and ultimate strength of the Mg-Si alloy was increased 1.2 times by substitution with pure Al, with an insignificant decrease in hardness. The properties of the Ni-Al alloy were not significantly altered by substitution of the eutectic with either pure Al or an Al-Cu alloy. Orig. art. has: 5 figures and 3 tables.

ASSOCIATION: Institut metallurgii AN SSSR (Metallurgical Institute, AN SSSR)

SUBMITTED: 00

DATE ACQ: 25Jan64

ENCL: 01

SUB CODE: MM

NO REF SOV: 007

OTHER: 000

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ACCESSION NR: AT4009501

ENCLOSURE: 01

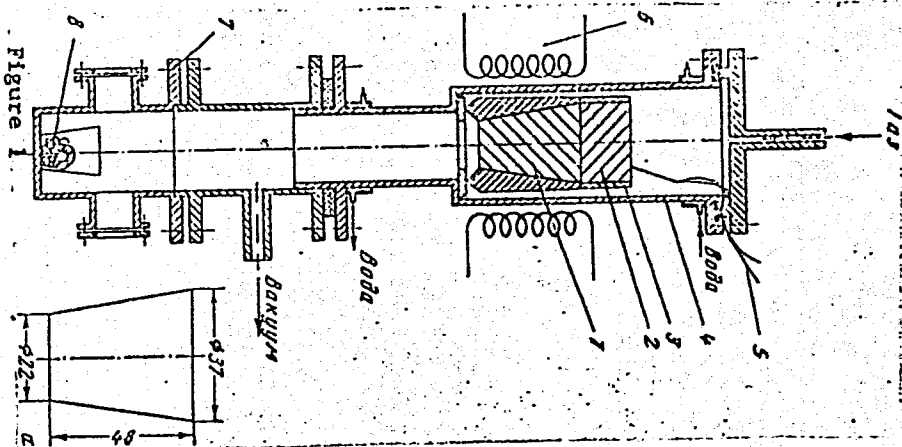


Figure 1.

Schematic view of the vacuum apparatus for introduction of low-melting components into alloys. a - dimensions of the experimental specimen; 1 - original alloy; 2 - substituting alloy; 3 - container for the substituting alloy; 4 - stainless steel pipe; 5 - thermocouple; 6 - electric furnace; 7 - receptacle for the displaced component; 8 - displaced component.

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SAVITSKIY, Ye.M.; BARON, V.V.; YEFIMOV, Yu.V.; GLADYSHEVSKIY, Ye.I.

Investigating the structure and properties of some alloys in
the system vanadium - niobium - silicon. Trudy Inst. met.
no.12:166-178 '63. (MIRA 16:6)

(Vanadium-niobium-silicon alloys—Metallography)
(Phase rule and equilibrium)

PEKAREV, A.I.; SAVITSKIY, Ye.M.; TYLKINA, M.A.

Interaction of lithium with titanium at high temperatures.
Trudy Inst. met. no.12:189-192 '63. (MIRA 16:6)

(Diffusion coatings)
(Titanium---Metallography)
(Lithium---Thermal properties)

SAVITSKIY, Ye. M.; BUROV, I. V.; TEREKHOVA, V. F.; KASHIN, V. I.

Iron-aluminum alloys with additions of rare and rare-earth
metals. Trudy Inst. met. no.13:163-170 '63. (MIRA 16:4)

(Iron-aluminum alloys--Metallurgy)
(Metals, Rare and minor)

SAVITSKIY, Ye.M.; BARON, V.V.; BYCHKOVA, M.I.

Interaction of niobium with molybdenum and silicon. Trudy
Inst. met. no.12:179-188 '63. (MIRA 16:6)

(Niobium-molybdenum-silicon alloys--Metallography)
(Phase rule and equilibrium)

SAVITSKIY, Ye.M.; TYLKINA, M.A.; POLYAKOVA, V.P.

Phase diagram of the system ruthenium - rhenium - osmium.
Zhur.neorg.khim. 8 no.1:146-418 Ja '63. (MIRA 16:5)
(Ruthenium-rhenium-osmium alloys)

SAVITSKIY, Ye.M.; BARON, V.V.; KARASIK, V.R.; AKHMEDOV, S.Sh.; PAKHOMOV, V.Ya.;
BYCHKOVA, M.I.

Producing a high magnetic field with the aid of a niobium-zirconium
alloy. Prib. i tekhn. eksp. 8 no.1:182-183 Ja-F '63. (MIRA 16:5)

1. Fizicheskiy institut AN SSSR.
(Magnetic fields) (Niobium-zirconium alloys)

L 11287-63

ENP(q)/EMT(m)/BDS AFFTC/ASD JD/JG

S/0078/63/008/008/1991/1993

ACCESSION NR: AP3004355

AUTHOR: Terekhova, V. F.; Markova, I. A.; Savitskiy, Ye. M.

TITLE: Phase diagram of alloys of the yttrium-tin system

SOURCE: Zhurnal neorganicheskoy khimii, v. 8, no. 8, 1963, 1991-1993

TOPIC TAGS: yttrium-tin system, yttrium-tin-system phase diagram, yttrium-tin mutual solubility, yttrium-tin compound, yttrium-tin-alloy brittleness, yttrium-tin-alloy oxidation

ABSTRACT: Sixteen Y-Sn alloys with 0 to 100% Sn were melted from 99% pure Y and 99.9% pure Sn in an arc furnace in a helium atmosphere. The alloys were vacuum-annealed: Y-rich alloys (up to 40 wt% Sn), for 150 hr at 1200C; alloys with 40-70 wt% Sn, for 150 hr at 1000C; and Sn-rich alloys (up to 25 wt% Y), for 200 hr at 200C. Results of metallographic, x-ray diffraction, and thermal analyses and hardness tests were used as a basis for plotting the phase diagram of the system (see Fig. 1 of Enclosure). Alloys with 40-75 wt% Sn oxidize readily in air and are very brittle. On the Sn side there is probably a pseudoeutectic close to pure Sn. Microscopic and x-ray diffraction-pattern examination (the latter

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L 14287-63

ACCESSION NR: AP3004355

carried out by P. I. Kripyakevich) indicates a possibility of the existence of two compounds whose structure has not yet been determined. The solubility of Sn in solid Y does not exceed 1 wt%. The maximum solubility of Y in solid Sn is 0.3 wt%. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 18Feb63

DATE ACQ: 21Aug63

ENCL: 01

SUB CODE: ML

NO REF SOV: 001

OTHER: 001

Card 2/32

MARKOVA, I.A.; TEREKHOVA, V.F.; SAVITSKIY, Ye.M.

Phase diagram of alloys in the prasedymium-neodymium system.

Zhur. neorg. khim. 8 no.8:1998-2000 Ag '63.

(MIRA 16:8)

(Phaseodymium-neodymium alloys)
(Phase rule and equilibrium)

BUROV, I.V.; TEREKHOVA, V.P.; SAVITSKIY, Ye.M.

Phase diagram for cerium - gadolinium. Zhur. neorg. khim. 8 no.12:
2685-2693 D '63.
(MIRA 17:9)

CHECHERNIKOV, V.I.; BUROV, I.V. ; SAVITSKIY, Ye.M.

Magnetic properties in the system iron - gadolinium. Fiz. met.
i metalloved. 16 no.3:324-328 S '63. (MIRA 16:11)

1. Moskovskiy gosudarstvennyy universitet imeni Lomonosova i
Institut metallurgii imeni A.A.Baykova.

ACCESSION NR: AP4004686

S/0126/63/016/005/0663/0668

AUTHORS: Naumkin, O. P.; Terekhova, V. F.; Savitskiy, Ye. M.

TITLE: Anisotropy of properties of scandium single crystal

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 5, 1963, 663-668

TOPIC TAGS: anisotropy, scandium property, scandium anisotropy, scandium single crystal, thermal emf, scandium microhardness, scandium magnetic property, single crystal anisotropy, crystal anisotropy, magnetic property, single crystal, scandium

ABSTRACT: The electrical, mechanical, and magnetic properties of scandium single crystals have been investigated. Specimens (9 x 6 x 14 mm) were prepared by the method of recrystallization annealing. At room temperatures the crystal exhibits a close-packed hexagonal structure, determined by the Laue method. The specimen is shown to possess an anisotropy along the principal direction of the hexagonal lattice. The magnitude of anisotropy determined by measuring the thermal emf along axes a and c was 200%, using the expression $\epsilon_{sc} = - \frac{\Delta E_a}{\Delta E_c} \cdot e_c + e_{cu}$. Measuring the microhardness on the planes (0001) and (1010), this value was 100%, whereas the inverse paramagnetic permeability in a field parallel and perpendicular to the

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ACCESSION NR: AP4004686

c-axis gave a value of 30% at room temperature. The microhardness on the (0001) plane was 210 kg/mm² and on (10 $\bar{1}$ 0) it was 102 kg/mm². "The author is grateful to R. M. Liberman (Giredmet) for procuring the specimens, to V. Sh. Shekhtman (IMET im. A. A. Baykova) for helping in crystal orientation, and to A. A. Babareko (IMET im. A. A. Baykova) for his advice." Orig. art. has: 4 figures, 2 tables, and 2 formulas.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy)

SUBMITTED: 16Jan63

DATE ACQ: 03Jan64

SUB CODE: MM

NO REF SOV: 004

ENCL: 00

OTHER: 006

Card 2/2

SAVITSKIY, Ye.M.; VINOKUROV, V.P.

Apparatus for tensile testing of refractory metals at
high temperatures in a vacuum. Zav.lab. 29 no.3:378-379
'63. (MIRA 16:2)

1. Institut metallurgii imeni A.A. Baykova.
(Metals at high temperatures)
(Testing machines)

SAVITSKIY, Ye.M., doktor khim. nauk; KOPETSKIY, Ch.V.; BURKHANOV, G.S.

Refractory metals and their role in modern technology. Vest.
AN SSSR 33 no.10:29-36 0 '63. (MIRA 16:11)

SAVITSKIY, Ye.M.; TEREKHOVA, V.F.; NAUMKIN, O.P.; BUROV, I.V.

Obtaining single crystals of scandium, yttrium, and gadolinium.
TSvet. met. 36 no.5:51-52 My '63. (MIRA 16:10)

S/053/63/079/002/003/004
B102/B186

AUTHORS: Savitskiy, Ye. M., Terekhova, V. F., Naumkin, O. P.

TITLE: The physico-chemical properties of the rare-earth metals,
scandium and yttrium

PERIODICAL: Uspekhi fizicheskikh nauk, v. 79, no. 2, 1963, 263 - 293

TEXT: This is a review article that covers the most important literature of the last 10 years. It contains the following chapters: (1) Electron structure of the rare-earth metals; (2) Chemical properties; (3) Physical properties (lattice structure, density, melting point and polymorphous transition point, vapor pressure, boiling point and evaporation temperature, thermal expansion, electrical properties, specific heat and thermal conductivity, magnetic properties); (4) Mechanical properties (elastic constants and their temperature dependence, methods of investigating the mechanical properties, hardness, mechanical properties in the case of deformation, pressure treatment of rare-earth metals). There are 14 figures, 15 tables, and 116 references. ✓

Card 1/1

1. V. I. KIL, Ye. M., prof., doktor khim. nauk, otv. red.; TIRAKHOVA,
V. I., kand. tekhn. nauk, otv. red.

[Theory of rare earth metals and their applications;
materials] Voprosy teorii i primeneniya redkozemel'nykh
metallov; materialy. Moskva, Nauka, 1964. 270 p.

(MIRA 17:8)

1. Vsesoyuznoye soveshchaniye po splavam redkikh metallo-
1963.

L 26073-66 EPF(n)-2/EWT(m)/I/EWP(w)/EWP(t) WW/JD/JG/GS
ACC NR: AT6014747 (A)

SOURCE CODE: UR/0000/65/000/000/0039/0043

AUTHOR: Myzenkova, L. F.; Baron, V. V. (Candidate of technical sciences);
Yefimov, Yu. V.; Savitskiy, Ye. M. (Doctor of chemical sciences)

ORG: none

TITLE: Effect of alloying additions on the superconductivity of niobium-zirconium
alloys

SOURCE: Soveshchaniye po metallovedeniyu i metallofizike sverkhprovodnikov. 1st,
1964. Metallovedeniye i metallofizika sverkhprovodnikov (Metallography and physics of
metals in superconductors); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 39-43

TOPIC TAGS: superconductivity, alloy superconductivity, niobium alloy, zirconium
containing alloy, lanthanum containing alloy, cerium containing alloy, iron containing
alloy, titanium containing alloy, superconductive alloy

ABSTRACT: The effect of small additions of cerium, lanthanum, titanium, and iron on
the critical current density (I_k) of niobium-zirconium alloys has been investigated.
Alloy wires 0.25 mm in diameter, containing 25 and 50 wt% Zr and up to 0.36% La,
0.39% Ce, 5.44% Ti, or 0.5% Fe individually added, were tested at 4.2 K in a magnetic
field of 22.4 kGs. Ti, Fe, La, and Ce at contents of up to 0.1% increased consid-
erably the I_k of Nb + 50% Zr alloy. At higher contents, I_k dropped again (see Fig. 1).
In the case of Nb + 25% Zr alloy, the maximum on the I_k -composition curves was

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ACC NR: AT6014747

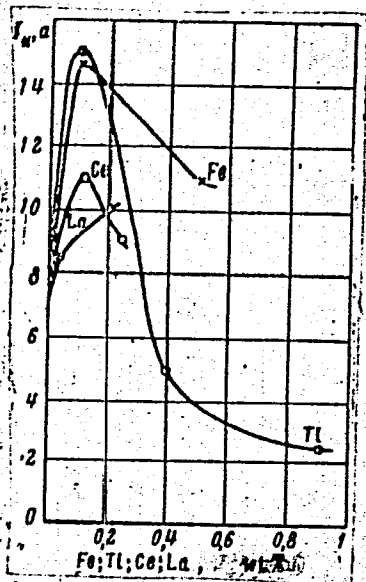


Fig. 1. Critical current of Nb + 50% Zr alloy versus content of alloying addition at an intensity of the magnetic field of 22.2 kGs.

observed at higher contents of alloying elements, for instance, at 1% titanium, but the effect was much weaker than in alloy with 50% Zr. The effect of higher content of alloying elements was studied with alloys containing 5 and 10% Ti and 20—45% Zr.

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ACC NR: AT6014747

At 5% Ti the maximum I_k , $4.45 \cdot 10^4$ a/cm², was observed at 28% Zr and in alloys with 10% Ti, at 25% Zr (I_k , $3.65 \cdot 10^4$ a/cm²). Ti, La, and Ce improved and Fe did not affect the workability of alloys. Annealing at 900 C for 1 hr had a beneficial effect on the I_k of alloys with 25 and 50% Zr containing La and Ce. Orig. art. has: 4 figures. [WW]

SUB CODE: 11/ SUBM DATE: 23Dec65/ ORIG REF: 003/ OTH REF: 001/ ATD PRESS:

4253

Card 3/3 CC

L 14960-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) ESD(gs) JD/JC/WB/MLK

ACCESSION NO: AT4048696

S/0000/64/000/000/0071/0078

AUTHOR: Naumkin, O. P.; Terekhova, V. F. (Candidate of technical sciences);
Savitskiy, Ye. M. (Professor, Doctor of chemical sciences) B

TITLE: Investigation of the properties of metallic scandium 27

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of
rare-earth metals); materialy* soveshaniya. Moscow, Izd-vo Nauka, 1964, 71-78

TOPIC TAGS: scandium, rare earth metal, scandium purification, scandium oxidation,
scandium crystal structure, scandium corrosion 18

ABSTRACT: The properties of the rare earth metal scandium have been investigated only during the last 2-3 years. The metal used in the present tests was obtained by thermal reduction of scandium fluoride with calcium, since that obtained by industrial processes contains admixtures such as calcium, oxygen, iron and copper and is not over 96-98% pure. Scandium was purified either by vacuum melting, by electron ray zone melting or by vacuum distillation, the best results being obtained by the last method. Cold drawn/wire 0.8-0.9 mm thick could be obtained from a 5x5 mm distilled sample without

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ACCESSION NR: AT4048696

prior annealing. Thin films (400A) of pure Sc were then tested for corrosion. After 60 minutes at room temperature, an oxide film was formed on the scandium. After 10 minutes at 100C, the quantity and intensity of Sc_2O_3 lines increased sharply. The non-oxidized metal remained in this condition up to 200C. At 300C for 2 hours, a scandium film 400A thick was oxidized completely. Massive samples with a purity of 99.2% were also tested. The maximal thickness of the oxide film after exposure to air at room temperature for 128 days is about 150 A. The protective properties of this oxide film are preserved only up to 300C. Only scandium oxide is formed on the metal films when they are heated from 20 to 900C. No weight gain is detected when massive samples of scandium are heated up to 300C for 24 hours. The highest rate of scandium oxidation is observed at 600-700C. Electronic and X-ray analysis shows that the outer white layer on massive samples exposed to air consists of Sc_2O_3 , while the inner darker layer is ScN . Single crystals of scandium obtained by recrystallization annealing were also tested. This is the best method for preparing rare earth metals, since it ensures the highest purity. Annealing was performed at 1350C for 20 hours. The thermoelectromotive force of a polycrystalline sample was found to be $-5.32 \mu\text{V}/\text{degree}$, compared to

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ACCESSION NR: AT4048696

3

-2.65 for monocrystalline scandium parallel to the C axis and -8.04 perpendicular to the C axis. The anisotropy of the thermoelectromotive force of monocrystalline scandium was 3.03. Anisotropy of the hardness of single crystals of hexagonal structure is wellknown. Similar anisotropy is therefore not surprising in scandium, which has a hexagonal crystal lattice. "D. V. Ignatov, V. I. Chechernikov and I. Pop also took part in aspects of the work." Orig. art. has: 9 figures and 1 table.

ASSOCIATION: None

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: IC, MM

NO REF SOV: 004

OTHER: 001

Card

3/3

L 23886-65 EWT(m)/EPF(n)-2/EPR/EWP(t)/EWP(b) Ps-4/Pu-4 IJP(c) JD/

ACCESSION NR: AT5002764 JG/MLK S/0000/64/000/000/0110/0116

AUTHOR: Savitskiy, Ye. M. (Doctor of chemical sciences), Chuprikov, G. Ye.

TITLE: Influence of oxygen on the fine structure, deformation mechanism, and physicommechanical properties of rhenum metal

SOURCE: Vsesoyuznoye soveshchaniye po probleme reniya. 2d, Moscow, 1962. Reniy (Rhenium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 110-116

TOPIC TAGS: rhenum, rhenum microstructure, rhenum deformation, rhenum mechanical property, rhenum conductivity, oxygen absorption, rhenum oxide, zone refining, electron beam refining

ABSTRACT: This article is a review of work done on the influence of oxygen on the properties of rhenum. When the oxygen content of rhenum reaches 0.022%, the plastic properties of the metal decline sharply, and its hardness, strength, and electrical resistivity at room temperature increase. The penetration of oxygen into the rhenum lattice causes the blocking of elementary plastic events when the metal is deformed; this deformation is associated with a lower degree of crushing of the initial crystal structure and a more pronounced accumulation of residual stresses as compared to the pure material. This penetration also causes the "wedging" of the regular glide systems

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L 23886-65

ACCESSION NR: AT5002764

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and the involvement of new glide systems which act at higher stresses and are associated with a considerable increase in internal strain and a substantial decrease in plasticity. That part of the oxygen which combines with rhenium to form oxides along the grain boundaries is particularly harmful to the plasticity of the metal. Electron-beam vacuum zone refining and the elimination of grain boundaries (i.e., preparation of single crystals) cause an appreciable decrease in the content of interstitial impurities and thus increase the plasticity of rhenium, both at room temperature and at low temperatures. "In conclusion, the authors express their deep appreciation to L.N. Guseva, A.A. Babareko, V.N. Kochinskiy, and G.G. Glavin for their suggestions. The resistivity of the rhenium samples was determined by V.N. Kochinskiy at MGU." Orig. art. has: 6 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 05Aug64

ENCL: 00

SUB CODE: MM

NO REF SOV: 009

OTHER: 004

Card 2/2

L 25040-65 EWT(m)/T/EWP(t)/EWP(b) JD/JG/MLK

ACCESSION NR: AT4048701

S/0000/64/000/000/0116/0123

AUTHOR: Burov, I.V.; Terekhova, V.F. (Candidate of technical sciences);
Savitskiy, Ya.M. (Professor, Doctor of chemical sciences)

TITLE: Phase diagrams of systems involving gadolinium

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-
earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 116-123

TOPIC TAGS: ²⁷gadolinium, rare earth metal, rare earth alloy, gadolinium phase diagram,
gadolinium alloy behavior, gadolinium solid solution /8

ABSTRACT: The history of gadolinium and its properties are briefly reviewed, and studies are reported in which experimental alloys were prepared with highly purified metals, and the basic methods of physicochemical analysis (microstructural, thermal, X-ray, dilatometric, etc.) were used for their investigation. The phase diagrams for Mg-Gd, Ce-Gd, Fe-Gd and Co-Gd are illustrated and discussed. Gd and Mg are infinitely intersoluble in the liquid state. Four chemical compounds were detected in this system: MgGd, Mg₂Gd, GdMg₃ and Mg₃Gd. In the solid state, solubility is insignificant. High-temperature isomorphic modifications of δ cerium and δ - gadolinium formed a continuous range of

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ACCESSION NR: AT4048701

0

solid solutions. The interaction of low-temperature modifications was more complex, with the formation of a crystalline compound Ce_2Gd_5 (γ -phase). The mechanism of this formation was not determined. Gd and Fe are completely miscible in the liquid state, but barely soluble at room temperature. Four chemical compounds were found, among which $\text{Fe}_{17}\text{Gd}_2$ had not previously been identified. The miscibility and solubility of the Gd-Co system resembled that of Gd-Fe. Six previously known compounds and one new one, $\text{Co}_{17}\text{Gd}_2$, with a trigonal syngony, were found. Based on the literature and their own experimental data, the authors also survey the rules of gadolinium alloying behavior. It forms broad ranges of solid solutions only with the rare earth metals and there are broad ranges of non-miscibility in the liquid phase with a number of elements found in groups of the periodic system such as IA, IIA, VA and VIA (Na, Ca, V, Nb, Ta, U). It forms no chemical compounds with elements belonging to the IA-VIA subgroups, except for H, Be, Mg and the rare earths of the cerium subgroup. A graph showing the main types of phase diagrams and the number of chemical compounds formed by Gd with elements of various subgroups is presented. This could serve as a basis for selecting the range of technological alloys with Gd. The rules listed apply only to Gd and differ for the other rare earth metals.

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ACCESSION NR: AT4048701.

The differences in the phase diagrams are tabulated for binary systems of La and Ce among themselves and with Mg, Ti, Mn and Fe. They show that the rare earth metals La, Ce and Gd, which differ only in the number of the 4f electrons, behave differently in their alloys; thus the 4f electrons are assumed to exert a significant effect on the type of phase diagram of these alloys. The greatest uniformity of behavior was observed for the alloys of a non-transition element with rare earth metals, and the greatest difference for the transition elements with unfilled electron shells. Orig. art. has: 5 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: IC,SS

NO REF SOV: 002

OTHER: 002

Card 3/3

L 25039-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) IJP(c) JD/JG/MLK

ACCESSION NR: AT4048702

S/0000/64/000/000/0124/0128

21
B+1

AUTHOR: Markova, I.A.; Terekhova, V.F. (Candidate of technical sciences); Savitskiy, Ye. M. (Professor, Doctor of chemical sciences)

TITLE: Yttrium and the prospects for its use

SOURCE: ²⁷ Vsésoyuznoye soveshchaniye po splyavam redkikh metallov, 1963. Voprosy* teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 124-128

TOPIC TAGS: yttrium physicochemical property, ¹⁸ distilled yttrium, yttrium alloy, yttrium alloy phase diagram, rare earth alloy

ABSTRACT: This is a review of studies published and conducted in the SSSR and abroad on the properties of yttrium and its present and possible future applications. At the Laboratoriya redkikh metallov; splyavov (Laboratory of Rare Metals and Alloys), studies are being conducted on the physicochemical properties of pure yttrium and its interaction with the basic industrial metals. Distilled yttrium of 99.6% purity and monocrystalline Y can now be investigated. Phase diagrams of yttrium with the basic industrial metals (over 20) have been published in the last 5 years. Those investigated at the authors' laboratory are listed

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L 25039-65

ACCESSION NR: AT4048702

and described: phase diagrams with non-mixability were determined for Y with metals of the IA, IIA and VA subgroups of the periodic system, as well as with Cr and U; eutectic phase diagrams are shown for Ti, Zr, Hf, Mo and W. A continuous series and a wide range of solid solutions are obtained only with the rare earth metals, scandium and thorium. In all other cases, the range of solid solutions is rather narrow, to 1.0% by weight. Phase diagrams of Y with La and Ce reveal the formation of chemical compounds in the solid YLa and YCe phase. On the basis of the physical properties of the pure metal and its phase diagrams, basic guidelines for the use of yttrium in industry may be projected. Its applications are listed, and its effect on high-melting metals, particularly V, Nb and Cr, is stressed. The addition of 1.0 wt. % Y to chromium, for example, will sharply decrease nitrogen diffusion in the latter, thus increasing thermal stability. The use of Y and its compounds in nuclear technology is also mentioned (U.S. source). Studies for new applications as superconductors or semiconductors are far from completed. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 13Jun64

NO REF SOV: 003

ENCL: 00

OTHER: 001

SUB CODE: IC, MM

Card 2/2

SAVITSKIY, Ye.M. (Moskva); KISELEV, Ch.V. (Moskva); ARSHATA, Ye.I. (Moskva)

Characteristics of plastic deformation and mechanical properties
of certain metallic compounds. Izv. AN SSSR. Met. i gor. delo
no.6:129-136 N-D '62. (MIRA 18:3)

L 25045-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(b) Pu-l IJP(c) JD/JG/j
 ACCESSION NR: AT4048703 MLK S/0000/64/000/000/0138/0140 28

AUTHOR: Savitskiy, Ye. M. (Professor, Doctor of chemical sciences); Baron, V.V. 8+1
 Frolov, V.A.

TITLE: The effect of reduction by rare earth metals on molybdenum plasticity 27 27 18

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
 teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-
 earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 138-140

TOPIC TAGS: molybdenum plasticity, molybdenum reduction, rare earth reducing agent,
 metal impurity, lanthanum boride, molybdenum alloy plasticity

ABSTRACT: Purification of refractory metals from admixtures such as C, H, N or O,
 which cause brittleness, would render them more adaptable to structural uses. In con-
 tinuation of previous work at the Laboratoriya redkikh metallov i splavov (Laboratory of
 Rare Metals and Alloys), IMET, where La, Nd, and Pr had been found to exert the best
 effect on molybdenum plasticity, the authors studied the effect of reduction with La and a
 mixture of rare earth metals on Mo plasticity. Using, e.g., 0.15% La which was melted
 with Mo in an arc furnace under helium, the authors found that the hardness of cast Mo

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L 25045-65

ACCESSION NR: AT4048703

was decreased sharply by up to 0.2 wt. % rare earth metal. The resulting alloy showed much better plasticity compared to non-reduced Mo; it could be forged and rolled to 90% deformation. The introduction of rare earths encountered difficulties, however, because of the great difference in the melting points of the starter materials and the high vapor pressure of the rare earth admixtures. A number of alloying mixtures of La with B, Ni and Al compounds were developed which have a higher melting point; these were then used successfully. Molybdenum reduced by lanthanum boride could be hammered and rolled at 700C to 98% deformation without breaking. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: IC, MM

NO REF SOV: 002

OTHER: 001

Card 2/2

L 23889-65
JD/JG/MLK

EWI(m)/EPF(n)-2/EPR/T/EWP(t)/EWP(b) PS-4/Pu-4 IJP(c)

ACCESSION NR: AT5002769

S/0000/64/000/000/0138/0154

AUTHOR: Tylkina, M.A. (Candidate of technical sciences); Savitskiy, Ye. M. (Doctor of chemical sciences)

TITLE: Development of research on rhenum alloys

SOURCE: Vsesoyuznoye soveshchaniye po probleme reniya. 2d. Moscow, 1962. Reniy (Rhenium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 138-154

TOPIC TAGS: rhenum, rhenum alloy, phase diagram, multicomponent alloy, transition element, rhenum solid solution, rhenum alloy microstructure, rhenum alloy mechanical property

ABSTRACT: The article reviews the recent developments in rhenum research in three parts: (1) study of the physicochemical properties of rhenum, (2) study of the physicochemical interaction of rhenum with various elements of the periodic table and construction of phase diagrams of binary, ternary, and multi-component systems, and (3) development of new rhenum alloys, investigation of their physicochemical properties, and their applications in modern technology. The first part is very brief; the second is illustrated with 17 phase diagrams of binary systems formed by rhenum with transition metals of groups IV-VIII, as well as three ternary phase diagrams, and involves a discussion of the

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L 23889-65

ACCESSION NR: AT5002769

solubility of rhenium in transition metals of groups IV-VI in terms of their dimensional factor and electronegativity. The greatest emphasis of the article is placed on the discussion of alloys of rhenium with transition metals. Three groups of such alloys are discussed: (1) solid solutions of rhenium in transition metals of groups IV - VIII, (2) alloys of the middle portion of the diagrams, constituting chemical compounds, primarily of the type of σ and χ phases, and (3) alloys in the region of the rhenium-based solid solutions. The material is presented from the standpoint of the areas of application of the alloys and of the specific physicochemical properties of the alloys, which determine these applications. Mechanical properties of certain alloys of rhenium are tabulated and illustrated with graphs, and photomicrographs are given. Orig. art. has: 13 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 05Aug64

ENCL: 00

SUB CODE: MM

NO REF SOV: 029

OTHER: 013

Card 2/2

L 15194-65 EWT(m)/EWA(d)/EWP(t)/EWP(b) ESD(gs) MJW/JD/JG/WB/MLK
 ACCESSION NR: AT4048716 S/0000/64/000/000/0214/0217

AUTHOR: Savitskiy, Ye. M. (Professor, Doctor of chemical sciences), Popov, V. F., Keys, N. V., Lyubimov, V. N. ^B

TITLE: The effect of rare earth metals and their oxides on the plasticity and anti-corrosive properties of stainless steels ¹⁶

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy* teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 214-217

TOPIC TAGS: rare earth metal, rare earth oxide, steel plasticity, steel corrosion resistance, steel macrostructure, steel mechanical property, austenite grain, grain boundary ²⁷

ABSTRACT: Improvement of the stainless steels Kh18N12M2T and 1Kh18N9T ¹⁶ whose ingots had been marred by surface blisters and eddies, was sought by the additon of 0.05-0.18% rare earth metals (REM) or 0.08-0.12 % REM oxides (polyrite) under manufacturing conditions (described). The REM oxides were added into the ladle at temperatures of 1540-1570C; the metal remained in the ladle for 10-15 minutes before being poured. Test specimens were evaluated for macrostructure, the content of alpha phase, ¹⁶

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L 15194-65

ACCESSION NR: AT4048716

0
corrosion resistance and mechanical properties; plasticity was determined by the torsion test at high temperatures, the size of the austenite grains was determined microscopically. The additions were found to have a favorable effect on the technological properties of the 2 steels, resulting in an improved ingot surface due to better steel flowability, improved toughness, and disappearance of gross fissures at corners and planes of the bars, which reduced cleaning expenditure by 30-40%. Both the macrostructure and corrosion resistance improved, due to purification at the grain boundaries. Strength and plasticity increased while the anisotropy of the mechanical properties decreased. In the torsion tests at 1200C, the number of rotations required for breaking increased from 10 to 24 and from 13 to 23, respectively. The addition of REM oxides rather than the pure metal or a metal mixture affords considerable savings in the modifier cost. The austenite grain was smaller in the Kh18N12M2T steel after oxide addition. The optimal additions found under these experimental conditions are given. Orig. art. has: 1 table and 1 figure.

ASSOCIATION: None

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: MM

NO REF SOV: 008

OTHER: 001

Card 2/2

L 14775-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) ESD(gs) MJW/JD/MLK

ACCESSION NR: AT4048718

S/0000/64/000/000/0222/0225

AUTHOR: Savitskiy, Ye. M. (Professor, Doctor of chemical sciences), Popov, V. F.,
Keys, N. V.

TITLE: The effect of rare earth metals on the structure and properties of construction
steels

SOURCE: Vsesoyuznoye soveshchaniye po splavam redkikh metallov, 1963. Voprosy*
teorii i primeneniya redkozemel'nykh metallov (Problems in the theory and use of rare-
earth metals); materialy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 222-225

TOPIC TAGS: rare earth metal, steel, alloy steel, steel structure, steel mechanical
property, steel sulfur content, steel grain, steel impurity, ferrocerium

ABSTRACT: The selection of steels for which addition of rare earth metals (REM)
would be most effective, the quantity of REM to be added and their mode of introduction
into the steel were studied in the following experimental, high-quality alloys prepared in
pilot plants prior to introduction into manufacture: 18KhNVA, 30KhGSA, 12Kh2N4A.
The first alloy had a tendency to form intercrystalline grooves causing "spiders" and
laminations in the quenched metal, while the last 2 had low impact strength. The work

Card 1/2

L 14775-65

ACCESSION NR: AT4048718

was done under manufacturing conditions. Ferrocerium at a 0.1-0.28% concentration was added to the liquid steel in the ladle or during filling of the molds. Small cubes cut from various parts of the ingots served for the tests. The results showed a decrease in sulfur content by 20-30%. The macrostructure of the ingot improved, with a decrease in grain size. The mechanical properties of cast steel improved much more than those of quenched steel. This favorable influence of REM was most pronounced in 18KhNVA whose strength, plasticity and impact toughness improved by 12, 15 and 4%, respectively. The addition had an unfavorable effect on macrostructural flow. REM apparently facilitate the purification of liquid steel but introduce the products of chemical reactions with the impurities as complex refractory oxysulfides which may serve as additional crystallization centers; however, due to their surface-active properties, they also impede the growth of dendrite crystals during primary crystallization. Orig. art. has: 1 table and 2 figures.

ASSOCIATION: None

SUBMITTED: 13Jun64

ENCL: 00

SUB CODE: MM

NO REF SOV: 004

OTHER: 000

Card 2/2

SAVITSKIY, Ye.M., doktor khim. nauk, otv. red.; RYABCHIKOV, D.I.,
doktor khim. nauk, red.; BIBIKOVA, V.I., doktor tekhn.
nauk, red.; TYLKINA, M.A., kand. tekhn. nauk, red.;
POVAROVA, K.B., kand. tekhn. nauk, red.; BORISOVA, L.V.,
inzh., red.; MAKARENKO, M.G., red.

[Rhenium; transactions] Renii; trudy. Moskva, Nauka,
1964. 257 p. (MIRA 18:1)

1. Vsesoyuznoye soveshchaniye po probleme reniya. 2d, 1962.

I 12988-65 EWT(m)/EWP(w)/EWA(d)/EWP(t)/EWP(b) JD/JG/MLK
 S/0000/64/000/000/0395/0407
 ACCESSION NR: AT4047630

AUTHOR: Savitskiy, Ye. M.; Ty*lkina, M. A.; Polyakova, V. P.;
 Tsy*ganova, I. A.; Kopetskiy, Ch. V.

TITLE: Alloys of palladium with tungsten, rhenium, osmium^M, and iridium

SOURCE: Vsesoyuznoye soveshchaniye po elektricheskim kontaktam i
 kontaktny*m materialam. 3d, Moscow, 1962. Elektricheskiye kontakty* (Electric
 contacts); trudy* soveshchaniya. Moscow, Izd-vo Energiya, 1964, 395-407

TOPIC TAGS: palladium alloy, Pd-W, Pd-Re, Pd-Os, Pd-Ir

ABSTRACT: The results of an investigation of the physico-chemical interaction
 of Pa with W, Re, Os, and Ir are reported; four double constitution diagrams
 have been constructed; also, a triple diagram Pa-W-Re has been constructed;
 some characteristics of the above alloys have been investigated. With the above
 4 metals, Pd forms most simple diagrams with 2 limited solid solutions. No

Card 1/2

L 12988-65

ACCESSION NR: AT4047630

chemical compound was detected. All these metals increase the Pd melting point; W is particularly effective in this respect: with 20% W, the alloy melting point is 2,000C and the peritectic-reaction point is 2,175C. The micro-structure, hardness and effect of thermal treatment of the above alloys were investigated. Resistivity was measured at 25 and 100C; all additions increase the resistivity of Pd; a Pd+20% W alloy has 107-110 microhms-cm and a temperature coefficient of $(4.5-7) \times 10^{-5}$; coupled with Cu, this corrosion-resistant alloy develops 3.9 microvolt/degree; its ultimate strength, 65 kr/mm², with elongation up to 30%. Orig. art. has: 10 figures and 1 table.

ASSOCIATION: Institut metallurgii im. A. A. Baykova

(Institute of Metallurgy)

SUBMITTED: 13Jul64

ENCL: 00

SUB CODE: MM, EE

NO REF SOV: 000

OTHER: 000

Card 2/2

ACCESSION NR: AP4019818

S/0279/64/000/001/0176/0179

AUTHOR: Babareko, A. A. (Moscow); T'ao, Tsu-Ts'ung (Moscow); Savitskiy, Ye. M. (Moscow)

TITLE: Distortions of the crystal structure of Mo and the Mo-Re alloy during deformation

SOURCE: AN SSSR. Izv. Metallurgiya i gornoye delo, no. 1, 1964, 176-179

TOPIC TAGS: molybdenum, rhenium, molybdenum rhenium alloy, deformation related structural distortion, molybdenum structural distortion, diffraction line analysis, microdeformation analysis, elastic property anisotropy, molybdenum crystal structure

ABSTRACT: Processes occurring during the deformation of Mo of varying degrees of purity and of an Mo alloy with 35 at.% Re were studied to clarify the physical characteristics of the effect of alloying and purification on ductility. Structural distortion was evaluated in relation to the expansion of X-ray interference peaks for metals undergoing deformation. Test specimens were in the form of powders obtained by filling ingots of technical Mo, high-purity Mo, and Mo + 35 at.% Re and were screened through a 300-mesh screen. Interference peaks were automatically recorded on a URS-50 unit (monochromatic k_{α} -radiation). The width of
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ACCESSION NR: AP4019818

the lines at 110, 200, 112, 220, 310, 222 and 321 $m\mu$ was measured 5 times. It was found that the high ductility of pure Mo leads to a decrease in the dimensions of coherent scattering regions and lower microdeformation as compared to technical Mo ($8 \cdot 10^{-6}$ to $2.5 \cdot 10^{-6}$ cm and 0.0038 to 0.0025, respectively) due to greater depth of plastic deformation in pure Mo during the filling of the powders. Minor anisotropy of elastic properties of Mo results in a microdeformation- related anisotropic widening of the diffraction lines. Such anisotropy was absent for the Mo-Re system named above. "The author acknowledges the contribution of L. N. Gusevaya in evaluating the results". Orig. art. has: 4 tables and 3 formulas.

ASSOCIATION: none

SUBMITTED: 22Dec61

DATE ACQ: 31Mar64

ENCL: 00

SUB CODE: ML

NO REF SOV: 006

OTHER: 001

Card 2/2

L 23904-65 EWT(m)/EWP(w)/EPF(c)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(b) Pr-4/Pu-4
IJP(c) JD/JG/MLK

ACCESSION NR: AT5002770

S/0000/64/000/000/0155/0160

AUTHOR: Poyarova, K. B. (Candidate of technical sciences); Tylkina, M. A. (Candidate of technical sciences); Savitskiy, Ye. M. (Doctor of chemical sciences) B7

TITLE: Ternary tungsten-molybdenum-rhenium alloys

SOURCE: Vsesoyuznoye soveshchaniye po probleme reniya. 2d. Moscow, 1962. Reniy (Rhenium); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 155-160

TOPIC TAGS: rhenium, tungsten, molybdenum, ternary alloy, recrystallization temperature, mechanical property, nil ductility transition / temperature 6

ABSTRACT: A series of W-Mo-Re alloys containing 33—66% W, 22—40% Mo, and 11—24% Re has been investigated. Small, 70—75-g alloy ingots were preforged at 1400—1000C, rolled at 1200—800C (below the recrystallization point) with a total reduction of more than 90% to a thickness of 0.7—1.0 mm. The temperature of the beginning of recrystallization of the alloys varied from 1450 to 1550 depending on composition. The room temperature strength and elongation were 113 to

Card 1/2

L 23924-65

ACCESSION NR: AP5000121

allowable maximum length of workpiece 2000 mm, and allowable maximum diameter of workpiece 80 mm. The control box has a time-delay device and is used to control the welding equipment in operation.

ASSOCIATION: Shang-hai Lao-tung tien han chi ch'ang (Shanghai Lao-tung Electric Welding Equipment Plant)

SUBMITTED: 00

ENCL: 00

SUB CODE: IE

NR REF SOV: 000

OTHER: 000

Card 2/2

ACCESSION NR: AP4019491

S/0078/64/009/003/0671/0673

AUTHORS: Ty*lkina, M. A.; Polyskova, V. P.; Savitskiy, Ye. M.

TITLE: The palladium-tungsten-rhenium system

SOURCE: Zhurnal neorg. khimii, v. 9, no. 3, 1964, 671-673

TOPIC TAGS: palladium tungsten rhenium system, property, palladium tungsten rhenium alloy, phase diagram, fusion temperature, hardness, deformability, specific resistance, temperature coefficient

ABSTRACT: A portion of the phase diagram of the Pd-W-Re system was constructed and the properties of the alloys were investigated. The phase diagram of the Pd corner of the ternary system was constructed from physical-chemical data (fig. 1). Examination of the properties of the alloys (fig. 2) shows that increasing the rhenium content in the alloys lowers the fusion temperature of the ternary melt from the direction of Pd-W to the direction of Pd-Re. An increase in the rhenium content in the alloys greatly increases their hardness and simultaneously impairs their deformability at

Card 1/4

ACCESSION NR: AP4019491

room temperature. Alloying Pd-W alloys with rhenium lowers the specific resistance and raises its temperature coefficient. Orig. art. has: 3 figures.

ASSOCIATION: None

SUBMITTED: 18Feb63

DATE ACQ: 31Mar64

ENCL: 02

SUB CODE: CH, ML

NR REF SOV: 003

OTHER: 000

Card

2/4

ACCESSION NR: AP4019491

ENCLOSURE: 01

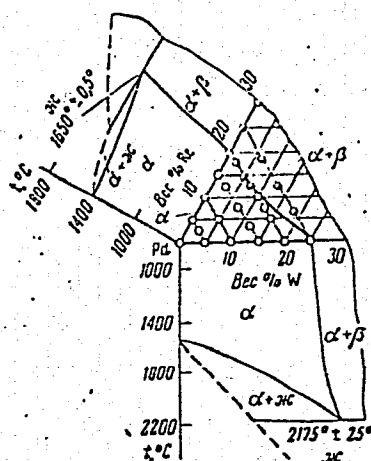


Fig. 1

Phase diagram of the palladium corner of the ternary system palladium-tungsten-rhenium

Card 3/4

ACCESSION NR: AP4019491

ENCLOSURE: 02

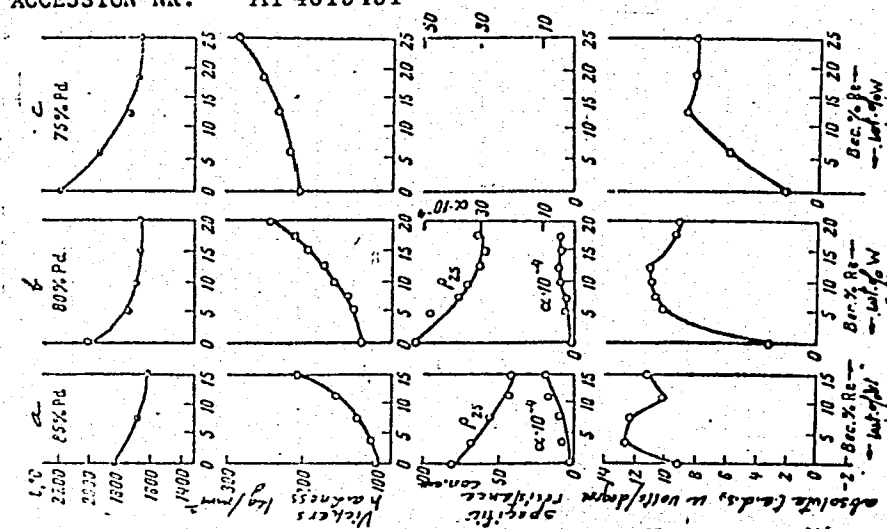


Fig. 2

Properties of palladium-tungsten-rhenium alloys: a--with constant palladium content of 85 wt. %; b--with constant palladium content of 80 wt. %; c--with constant palladium content of 75 wt. %

Cur. 4/4

L 23945-65 EWT(m)/EWP(b)/EWP(t) IJP(c) JD/JG

ACCESSION NR: AP4035965

S/0078/64/009/005/1155/1157

AUTHOR: Savitskiy, Ye. M.; Kripyakevich, P. I.; Baron, V. V.; Yefimov, Yu. V. B

TITLE: Phase diagram of the vanadium-gallium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1155-1157

TOPIC TAGS: vanadium gallium system, vanadium gallium phase diagram, vanadium gallium solubility, vanadium, gallium, vanadium gallium alloy

ABSTRACT: The phase diagram (Fig. 1) of the vanadium-gallium system was constructed based upon studies of microstructure, microhardness, and x-ray and thermal analyses. The studies established the existence of the compound VGa, which had an alpha-Fe type surface structure with a substructure of $a = 3.01\text{\AA}$, as well as the known compounds V_3Ga and V_2Ga_5 . It was also presumed that two additional compounds existed, one rich in Ga and the other closely approaching the composition V_5Ga_3 . The compounds were formed by peritectic reaction at the following temperatures: V_3Ga at 1525°C ; VGa at 1110°C , V_2Ga_5 at 1080°C ; the Ga-rich compound at 485°C ; and the compound approaching V_5Ga_3 at 1195°C . It was particularly found that the compound approaching V_5Ga_3 was stable only at high temperatures and decomposed at about

Card 1/3

L 23945-65

ACCESSION NR: AP4036965

935C. At 800C and below, the solubility of gallium in vanadium is about 10 at.%, whereas at 1525C the solubility is about 20 at.%. The solubility of vanadium in gallium in the solid state is negligibly small. A psuedoeutectic equilibrium was established at 29.8C from the Ga side of the system. Orig. art. has: 3 figures.

ASSOCIATION: Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Institute of Metallurgy, Academy of Sciences, SSSR)

SUBMITTED: 15Apr63

ENCL: 01

SUB CODE: MM

NO REF SOV: 003

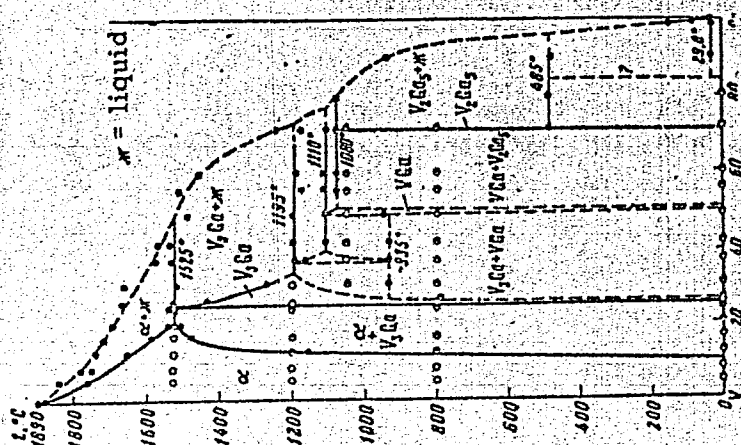
OTHER: 002

Card 2/3

L 23945-65
ACCESSION NR: AP4036965

ENCLOSURE: 01

Fig. 1. Phase diagram of the vanadium-gallium system



L 22209-65 EWP(e)/EWT(m)/EWP(w)/EPP(n)-2/EWA(d)/EPR/T/EWP(t)/EWP(b) Pa-Li/
 Pu-Li/Pad IJP(c)/ASD(m)-3/ASD(f)-3/AS(mp)-2/RAEM(e) AT/WH/WW/JD/RW/JG
 ACCESSION NR: AP5001615 S/0279/64/000/006/0129/0136

AUTHOR: Savitskiy, Ye. M. (Moscow); Kopetskiy, Ch. V. (Moscow);
Arskaya, Ye. M. (Moscow)

TITLE: Characteristics of the plastic deformation and mechanical properties of some intermetallic compounds

SOURCE: AN SSSR. Izvestiya. Metallurgiya i gornoye delo, no. 6, 1964, 129-136

TOPIC TAGS: intermetallic compound, plastic deformation, mechanical strength, temperature effect, Fe_2Ta compound, Fe_2Zr compound, $NiAl$ compound, Ni_3Ti compound, Ni_3Ta compound, Ni_3Nb compound, Ni_3Al compound

ABSTRACT: The effect of crystal structure on the deformation behavior of NiMe-type intermetallic compounds has been studied. Deformation was carried out by compression at temperatures ranging from -196C to 0.9-melting temperature. In Ni_3Nb single crystals at room temperature, slip occurred along the (010) plane. This is probably true of Ni_3Ta compound which is isomorphic with Ni_3Nb . (The Ni_3Nb compound has a CuTi-type c.p.h. lattice with the constants 5.10 and 4.52 kX)

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L 22209-65

ACCESSION NR: AP5001615

Additional slip planes were observed in polycrystalline Ni_3Nb . Great differences in the temperature-induced softening of ductile Ni_3Al , semiductile Ni_3Nb , Ni_3Ta , Ni_3Ti , and brittle Fe_2Zr and Fe_2Ta compounds were observed (see Fig. 1 of the Enclosure). The $NiAl$ compound, which at room temperature has a compressive strength of about 62 kg/mm² and is brittle, softened at 800C to such an extent that it sustained 70% compression without failure. It is concluded that crystal structure is the main factor determining the compression strength and behavior of metallic compounds at high temperatures. Orig. art. has: 5 figures and 1 table. [MS]

ASSOCIATION: none

SUBMITTED: 25Mar64

ENCL: 01

SUB CODE: IC, SS

NO REF SOV: 011

OTHER: 010

ATD PRESS: 3169

Card 2/3

L 22209-65

ACCESSION NR: AP5001615

ENCLOSURE: 01

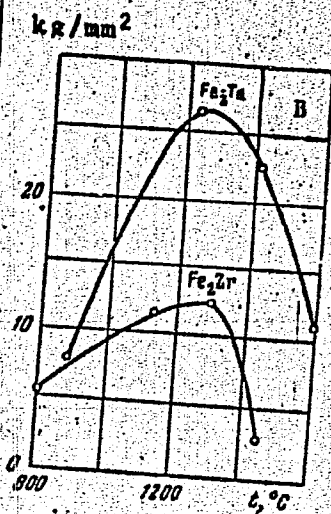
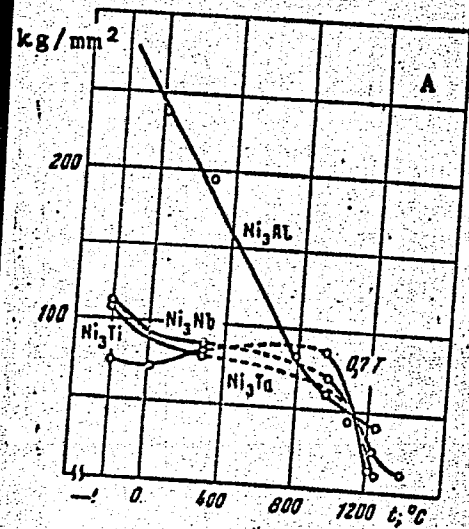


Fig. 1. Temperature dependance of the compression strength of intermetallic compounds

A - Ni₃Me-type compounds; B - Laves phases.

Card 3/3

L 11336-65 EWT(m)/EWP(t)/EWP(b) JD/JG

ACCESSION NR: AP4043405

S/0031/64/000/007/0038/0044

AUTHOR: Savitskiy, Ye. M.; Baron, V. V.; Duysemaliyev, U. K.; Yefimov, Yu. V.

TITLE: Phase diagram of the vanadium-copper system

SOURCE: AN KazSSR. Vestnik, no. 7, 1964, 38-44

TOPIC TAGS: vanadium copper system, vanadium copper alloy, vanadium copper alloy composition, vanadium copper alloy structure, vanadium copper alloy property

ABSTRACT: Twenty-five vanadium-copper alloys containing from 0 to 100% Cu were melted from 99.7% pure vanadium and 99.95% pure electrolytic copper. Vanadium-rich alloys were melted in a nonconsumable, tungsten-electrode arc furnace in a helium atmosphere under a 0.5-atm pressure. Copper-rich alloys were melted in the corundum crucible of a high-frequency furnace in an argon atmosphere under a 0.7-atm pressure. Alloys were homonized in vacuum at 900C for 50-100 hr. Fig. 1 of the Enclosure shows the phase diagram of the V-Cu system plotted on the basis of the data obtained. Additions of copper within the

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L 11336-65

ACCESSION NR: AP4043405

limits of solid solution increase the hardness and sharply decrease the ductility of vanadium, e.g., in cold upsetting pure vanadium cracks with a 71% reduction, whereas V-1.2% Cu alloy cracks with a 26.5% reduction. Small additions of vanadium increase the hardness, microhardness, and electrical resistivity of copper alloys. No intermetallic compounds are formed in the V-Cu system. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 00

ATD PRESS: 3100

ENCL: 01

SUB CODE: MM

NO REF SOV: 003

OTHER: 005

Card 2/3

L 11336-65

ACCESSION NR: AP4043405

ENCLOSURE: 01

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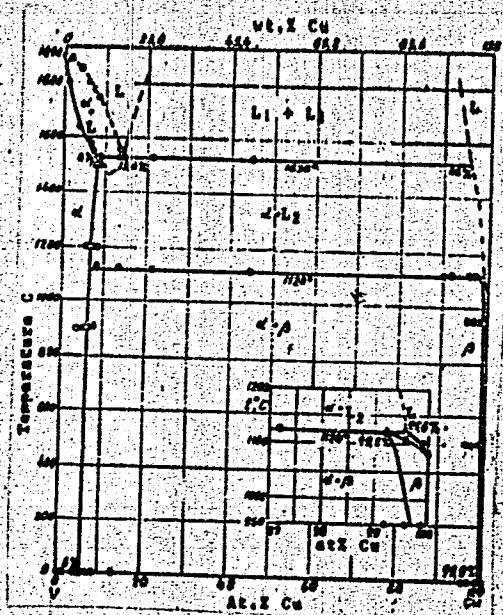


Fig. 1. Phase diagram of V-Cu system

Card 3/3

ACCESSION NR: AP4041583

S/0078/64/009/007/1645/1649

AUTHOR: Savitskiy, Ye. M.; Polyakova, V. P.; Ty*lkina, M. A.;
Burkhanov, G. S.

TITLE: Palladium-tantalum system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1645-1649

TOPIC TAGS: palladium tantalum system, palladium tantalum alloy,
palladium tantalum alloy structure, palladium tantalum alloy property

ABSTRACT: Palladium-tantalum alloys with a tantalum content varying from 0—100% were vacuum melted in a nonconsumable tungsten electrode induction furnace, in an atmosphere of purified helium, and under a pressure of 250 mm Hg, from 99.9% pure Ta and powdered 99.98% pure Pd. They were then studied by microscopic and x-ray diffraction methods, by hardness measurements, phase microhardness, and thermal emf. Alloys were studied in the as-cast condition and also after vacuum annealing at a temperature varying from 1000 to 1800C for periods of time from 30 min to 300—500 hr; in addition, alloys containing 80% and more of Ta were annealed at 2000C for 30 min. The phase diagram

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ACCESSION NR: AP4041583

of the Pd-Ta system (see Fig. 1 of the Enclosure) plotted on the basis of the obtained data is characterized by the presence of four metallic compounds in addition to limited solid solutions. One metallic compound is of a δ -phase type with a primitive tetragonal 8-U lattice with the parameters $a = 9.64$ kX, $c = 5.02$ kX; it has a microhardness of ~ 600 kg/mm² and exists between 1575—2350C. The second compound with a composition close to that of the PdTa compound has a bcc tetragonal lattice with constants $a = 3.28$ kX, $c = 6.00$ kX, and a microhardness of ~ 600 kg/mm². The alloy with 35% Ta contains a Pd₃Ta compound with a TiAl₃-type tetragonal lattice with constants $a = 3.87$ kX, $c = 7.94$ kX, and a microhardness of ~ 300 kg/mm². Annealing at 1650C of alloys containing 40—50% Ta, in which both the Pd₃Ta and PdTa compounds are present, produced a new phase which had a microhardness of ~ 400 kg/mm² and a composition close to that of the Pd₂Ta compound; its crystal lattice has not been determined. About 27 wt% of Ta is dissolved in Pd at melting temperature and about 7% at 1000C. The hardness of cast alloys increases from 54 to 640 kg/mm² when the tantalum content increases from 5 to 79.73 wt% (δ -phase), and drops sharply to ~ 170 kg/mm² in an alloy containing 85 wt% Ta (β -solid solution). Orig. art. has: 7 figures and one table.

Cord 2/4

ACCESSION NR: AP4041583

ASSOCIATION: none

SUBMITTED: 14Nov63

ATD PRESS: 3064

ENCL: 01

SUB CODE: MM

NO REF SOV: 002

OTHER: 003

Card 3/4

ACCESSION NR: AP4041583

ENCLOSURE: 01

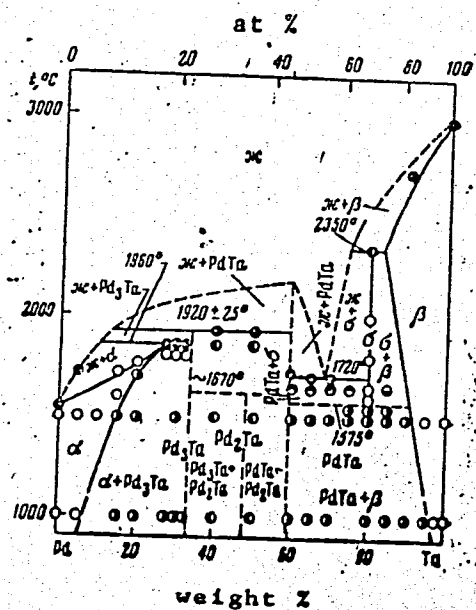


Fig. 1. Phase diagram of Pd-Ta system

Card 4/4

ACCESSION NR: AP4041584

S/0078/64/009/007/1650/1652

AUTHOR: Ty*lkina, M. A.; Tsy*ganova, I. A.; Savitskiy, Ye. M.

TITLE: The hafnium-niobium system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1650-1652

TOPIC TAGS: hafnium niobium system, hafnium niobium alloy, alloy phase composition, alloy structure, alloy property

ABSTRACT: Fourteen hafnium alloys with niobium contents of 0—100% have been studied by the method of physicochemical analysis. Alloys were melted from 98.5% pure hafnium and 99.4% pure niobium. Melting was performed in an unconsumable electrode-arc furnace in an atmosphere of helium under a pressure of 200 mm Hg. Alloys were studied in the ascast and annealed (at 750, 1000, 1500, or 1700C) conditions. Annealing at 1700 or 1500C (for 30 min) was performed in a vacuum, and annealing at 750 and 1000C (for 500 hr) in evacuated ampuls. At temperatures over 1800C, hafnium and niobium form a continuous series of solid solutions (see Fig. 1 of the Enclosure). The solubility

Card 1/3

ACCESSION NR: AP4041584

of hafnium in niobium at 820C does not exceed 10%; that of niobium in hafnium is even lower and does not exceed 3%. No chemical compounds were discovered in the system, but a rather sharp increase of hardness in hafnium-rich alloys from 451 kg/mm² at 90% hafnium to 538 kg/mm² at 95% hafnium indicates the possibility of the existence of the metastable ω -phase, usually encountered in systems containing titanium and zirconium. Orig. art. has: 2 figures, 1 table, and 2 formulas.

ASSOCIATION: none

SUBMITTED: 09May63

SUB CODE: MM

ATD PRESS: 3072

NO REF SOV: 003

ENCL: 01

OTHER: 004

Card 2/3

ACCESSION NR: AP4041585

S/0078/64/009/007/1653/1657

AUTHOR: Baron, V. V.; Yefimov, Yu. V.; Savitskiy, Ye. M.;
Gladyshchevskiy, Ye. I.

TITLE: Vanadium-niobium-silicon system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 7, 1964, 1653-1657

TOPIC TAGS: vanadium niobium silicon system, vanadium niobium silicon alloy, alloy phase composition, alloy structure

ABSTRACT: Phase equilibrium in alloys of the V-Nb-Si system containing up to 50% Si has been studied. Alloys were melted from 99.9% pure sintered Nb, 99.8% pure Si, and 99.4 or 99.9% pure V in an arc furnace with nonconsumable tungsten electrodes in purified helium under a pressure of 0.7 atm. Alloy ingots weighing 20—50 g were rapidly cooled immediately after solidification; half were then annealed at 800C for 2500 hr and quenched. X-ray diffraction and microstructural analysis and microhardness tests were used in the investigation. On the basis of the results, the equilibrium diagram of the V-Nb-Si system was plotted. The V_5Si_3 and the β -modification of Nb_5Si_3

Card 1/2

L 11307-65 EWT(m)/EPF(c)/EWP(t)/EWP(b) Pr-L JD/JG

ACCESSION NR: AP4043586

S/0078/64/009/008/2034/2036

AUTHOR: Markova, I. A.; Terekhova, V. F.; Savitskiy, Ye. M.

TITLE: Yttrium-erbium and yttrium-scandium alloys

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 8, 1964, 2034-2036 (B)

TOPIC TAGS: yttrium erbium alloy, yttrium scandium alloy, yttrium erbium phase diagram, yttrium erbium system, yttrium scandium system, yttrium erbium alloy property, yttrium scandium alloy property

ABSTRACT: The yttrium-erbium and yttrium-scandium systems were investigated. Alloys were melted from 99.6% pure yttrium and 98% pure erbium (the scandium purity was not specified) in an ore furnace in helium atmosphere. The yttrium-erbium system forms a continuous series of solid solutions. The curves of composition dependence of hardness and resistivity are typical for a system with a continuous series of solid solutions. Both curves show a maximum at approximately 70% erbium. All the alloys have a hexagonal, close-packed lattice of the magnesium type. The yttrium-scandium system was studied by similar methods. In this system the components form a

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continuous series of solid solutions between isomorphic modifications. The results concerning the yttrium-scandium system were confirmed by other researchers. Orig. art. has: 3 figures.

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